

Niklas Lauffer

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Education

University of California, Berkeley

PH.D. IN COMPUTER SCIENCE

Berkeley, CA

Fall 2021 - Present

- Studying problems at the intersection of formal methods and artificial intelligence.
- Advised by Sanjit Seshia.

University of Texas at Austin

B.S. COMPUTER SCIENCE HONORS AND B.S. MATHEMATICS

Austin, TX

May 2021

- Dean's Honored Graduate - the highest honor awarded to graduating students in the College of Natural Science.
- Thesis: "Online learning in Dynamic Stackelberg Games", supervised by Ufuk Topcu.
- Member of the Turing (CS) Honors program and Dean's (Math) Honors programs.
- High Honors, GPA: 3.98/4.0.

Experience

NASA Ames Research Center

RESEARCH INTERN

Mountain View, CA

May 2020 - August 2020

- Research at NASA Ames Research Center in the Automated Planning and Scheduling group, part of the Autonomous Systems and Robotics area.
- Formulated the theory behind dynamic rescheduling policies for Expected Value Probabilistic Simple Temporal Networks (EvPSTNs).
- Implemented dynamic rescheduling simulations for EvPSTNs to evaluate the effectiveness of different rescheduling policies.
- Developed a method for exactly solving the Dynamic Controllability problem for EvPSTNs using factored Markov Decision Processes.

RESEARCH INTERN

May 2019 - August 2019

- Formulated the theory behind and wrote an efficient mixed integer linear program (MILP) for calculating the greatest expected value schedule of a Probabilistic Simple Temporal Network. Implementation was done in Python using the Gurobi MILP solver.
- Helped develop planning algorithms for quantum circuit compilation.

Autonomous Systems Research Group

UNDERGRADUATE RESEARCHER

University of Texas at Austin

Fall 2017 - Spring 2021

- A member of Ufuk Topcu's research group in the Institute for Computational Engineering and Science.
- Developed methods for verifying the correctness of policies for Partially Observable Markov Decision Processes that make use of a neural network classifier in-the-loop.
- Led a NASA funded project to develop automated methods for scheduling aboard the International Space Station. Used the Z3 Satisfiable Modulo Theory solver to implement deterministic and dynamic scheduling strategies and techniques. This included developing methods to enumerate minimal unsatisfiable sets to generate human-understandable explanations for why constraints couldn't be met.
- Implemented control algorithms for exploring MDPs with unknown dynamics while exploiting the similarity between certain states.

Publications

- [N. Lauffer](#), W. Lassiter, and J. Frank. On Expected Value Strong Controllability. (Under review at JAIR).
- D. Raju, [N. Lauffer](#), U. Topcu. Reachability games for optimal multi-agent scheduling of tasks with variable durations. 2020 Combinatorial Optimization and Applications (COCO).
- H. Poonawala, [N. Lauffer](#), and U. Topcu. Training classifiers for feedback control with stability in mind. 2020 Automatica.
- [N. Lauffer](#), and U. Topcu. Human-understandable explanations of infeasibility for resource-constrained scheduling problems. 2019 ICAPS Workshop on Explainable Planning (XAIP).
- H. Poonawala, [N. Lauffer](#), and U. Topcu. Training classifiers for feedback control. 2019 IEEE American Control Conference.
- M. Ornik, J. Fu, [N. Lauffer](#), K. W. Perera, M. Alshiekh, M. Ono, and U. Topcu. Expedited learning in mdps with side information. 2018 IEEE Conference on Decision and Control (CDC).
- I. Papusha, U. Topcu, S. Carr, and [N. Lauffer](#). Affine multiplexing networks: System analysis, learning, and computation. 04 2018.

Projects and Authored Software

Expected Value Strong Controllability Toolbox

(not public yet)

Python toolbox for optimizing the expected value of Expected Value Probabilistic Simple Temporal Networks

AMNET

<https://github.com/ipapusha/amnet>

Python toolbox for affine multiplexing networks

Quadcopter Flight Software

<https://github.com/u-t-autonomous/Quad>

Software and controller written in C and C++

Awards and Honors

- University of Texas Dean's Honored Graduate - the highest honor awarded to 1% of graduating students in the College of Natural Science.
- National Science Foundation (NSF) Honorable Mention.
- Turing Scholars computer science graduate.
- Nominated for Turing Scholars' Best Thesis Award.